

## Lesson 1: Introduction to Stoichiometry and mole ratios

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- Stoichiometry is derived from the Greek words stoicheion (element) and metron (measure)
- Stoichiometry problems involve looking at chemical reactions and making measurements about reactants and products.
- Stoichiometry is quantitative in nature, which means we will be determining amounts of substances present.
- We assume that reactions are
  - 🔍 Stoichiometric – react in whole number ratios
  - 🔍 Quantitative – all reactants are used up
  - 🔍 Spontaneous
  - 🔍 Fast



- The types of measurement depends on the nature of the reaction and the chemical being analyzed

If the substance.....	Is a <b>solid</b>  then  you are measuring <b>mass</b>	<b>Dissolves in water</b>  then  you are measuring a <b>concentration</b>	Is a <b>gas</b>  Then  you are measuring <b>volume</b>
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$$n = \frac{m}{M}$$

$$n = cv$$

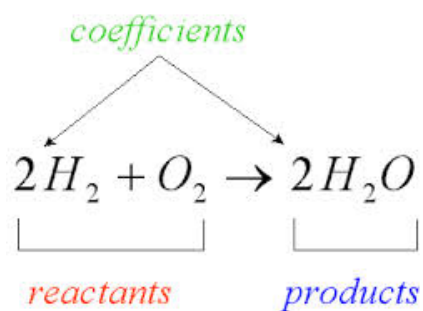
$$PV = nRT$$

$$n = \frac{V}{V_m}$$

- A chemical equation describes what happens when chemicals react or change.

It describes:

- The initial chemicals (reactants)
- The final chemicals (products)
- The ratio of chemicals - the coefficients in a balanced chemical reaction.

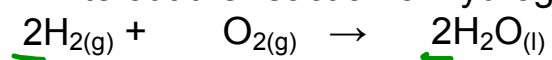


- This ratio is known as the **Mole Ratio**



**Examples:**

1. Write out the reaction of hydrogen and oxygen.



- a. What is the molar ratio of H<sub>2</sub> to O<sub>2</sub>?

$$2:1 \quad \left( \frac{2}{1} \right)$$

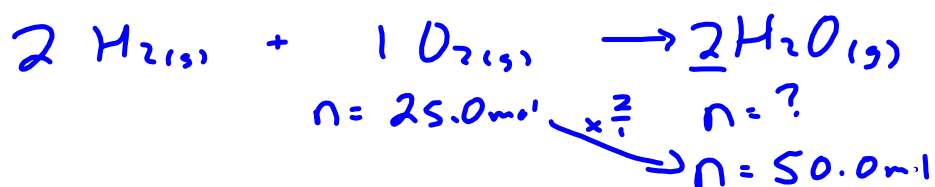
- b. What is the molar ratio of H<sub>2</sub> to H<sub>2</sub>O?

$$\frac{2}{2} \quad \frac{1}{1}$$

- c. What is the molar ratio of O<sub>2</sub> to H<sub>2</sub>O?

$$\frac{1}{2}$$

2. Hydrogen gas and oxygen gas combine to produce water vapour.  
 If 25.0 mol of oxygen gas react, how many moles of product are formed?



3. In a simple composition reaction, aluminum is burned with oxygen to produce a compound. If 35.8 mol of metal react, how many moles of gas are used up?

